SUPPLEMENTATION OF EWES WITH MIXED OAT - LUPIN GRAINS IN LATE PREGNANCY WHEN GRAZING WINTER PASTURES

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SUMMARY

In year one, 848, and in year two, 617 Border Leicester x Merino ewes, joined to Poll Dorset rams were offered nil (year 2 only), 183,365 or 550 g/day of lupin and oat grain (1:3) supplement for the 7 weeks of lambing. After lambing all ewes grazed pastures with at least 1500 kg green dry matter/ha. In year 1, when there was 200 kg green dry matter/ha at lambing, lamb growth rate to and weight at weaning were highest with 365 g/day of supplement ($P<0.001$). In year 2 with pastures of 1500 kg green dry matter/ha, supplementation increased birth weights ($P<0.05$), and growth rate to marking ($P<0.01$), but not growth rate to weaning. Responses to weaning in year 1 were associated with the lower levels of green pasture.

Keywords: supplementation, ewes, lambs, pregnancy, growth

INTRODUCTION

For prime lamb production, there is a need to identify cost-effective supplements to winter pasture for ewes in late pregnancy so as to enhance early lamb growth. Numerous experiments have examined supplement types and amounts during pregnancy (eg Kenney and Roberts 1984; Hall 1990), but rarely have these been done with large groups of animals managed under near commercial conditions. If supplementation of winter lambing ewes is effective it should enable lambs to be marketed earlier and realise the financial potential of markets before the usual decline in lamb prices in mid-spring (AMLC 1994). This paper describes supplementation experiments in 2 consecutive years at levels of input of labour and resources similar to commercial farms.

MATERIALS AND METHODS

The experiments were conducted at Temora, N.S.W. in 1991 (year 1) and 1992 (year 2) with details in Table 1.

Table 1. Details of experiments in year 1 and year 2

Experiment	Year 1	Year 2
Supplement	1:3 lupin: oat grain, 3 times a week	1:3 lupin: oat grain, 3 times a week
Treatments	183; 365; 550 g/day; 2 replications	0;183;365;550 g/day; 3 replications
Period of full feeding	24 June to 5 August	20 June to 7 August
Foetal scanning	30 April	5 May
Ewe liveweight	55.3 ± 0.4 (Feb)	55.1 ± 0.3 (Feb), 64.0 ± 0.3 (April)
(kg) ± SE	50.9 ± 0.3 (May), 50.8 ± 0.3 (Nov)	63.6 ± 0.3 (Aug), 58.2 ± 0.3 (Oct)
Lambing	19 June to 9 August, peak week 5	23 June to 7 August, peak weeks 4,5
Numbers	N=848 ewes, n=141,142	N=617 ewes, n= 50 to 53
Weaning	27 November	2 November

Management procedures followed the industry recommendations for Elite lamb production (Simpson *et al.* 1991). The Border Leicester x Merino (BLM) ewes were either 2, 3 or 5 years of age in year 1 and were derived from different sources. Ewes were joined in February and March to Poll Dorset rams. Ewes were then allocated to treatments and replications after ranking and randomisation on foetal number, sire and ewe age. In both years the supplement (Tables 1 and 2) was offered 3 times weekly from a trailed bin, with a 10 day introductory period. Lambs were weighed and identified at birth and males were cryptorchidised at lamb marking on 6 August 1991 or 31 July 1992. Lambs remained with their dams until weaning when the sexes were separated. Ewes and cryptorchids were sold at different ages. During lactation all ewes were grazed together and in spring pasture which had at least 1500 kg green dry matter (DM)/ha was available. Pasture availability was determined at the start and middle of the lambing period using a visual comparative yield method (Haydock and Shaw 1975). Nitrogen and metabolizable energy (ME) were estimated for samples of the grain and hay (Oddy *et al.* 1983).

Year 1 experiment

Ewes grazed pastures with low availability supplemented with some grain from mid-April and lost 4.4 kg liveweight from joining to mid-May (Table 1). The lambing paddocks varied from 19 to 25 ha. The pasture contained from 100 to 200 kg green DM/ha and 1000 to 3000 kg dead DM/ha on 20 June. Paddocks had similar herbage levels at 200 kg green DM on 8 July and this level was maintained to the end of lambing. Hay was fed at different levels in each paddock to ensure similar amounts of dry herbage were available in each paddock.

Year 2 experiment

All ewes were fed 500 g/day of lupins and oats from 5 May because of low pasture availability. There were 3 paddocks of either 22, 24 or 25 ha each which were further divided into 4 sub-plots for each treatment. The 3 paddocks had a similar amount of pasture at 1500 to 1750 kg green DM/ha and 500 to 1500 kg dead DM/ha but composition varied. Paddock 1 had Vulpia and barley grass with 20% capeweed, paddock 2 had barley grass with 10% clover and 15-20% capeweed and paddock 3 had Vulpia and barley grass with 10% clover and 40% capeweed. Pasture hay (Table 2) was provided for the first 3 weeks of lambing and then lucerne hay for the last month with each plot receiving the same amount.

Table 2. Composition of grains and hays offered in year 1 and year 2

	1991			1992		
	DM (%)	N (%)	ME (MJ/kg DM)	DM (%)	N (%)	ME (MJ/kg DM)
Oats	92.5	2.02	11.9	93.6	2.26	12.4
Lupins	92.1	4.98	12.9	92.6	4.91	13.2
Pasture hay	-	-	-	88.1	1.88	8.7
Lucerne hay	-	-	-	85.5	2.90	10.0

Statistical analysis

Total litter birth weight, growth rate to weaning, and weaning weight were analysed by AOV using REG (Gilmour 1988). Main effects fitted sequentially in the model consisted of litter size, ewe origin, ewe joining weight, sire joining group of the ewe, lambing day and treatment followed by interactions. Non-significant terms were progressively deleted from the model. Triplet born lambs were omitted from the growth analyses. Least square means were predicted from the final model. In year 1 lamb weights at weaning and prior to slaughter were analysed separately for each sex with the model including litter size, dam origin, dam joining weight, sire group of the dam and dam treatment prior to lambing. Because of the variability between replications each plot was initially considered as a separate treatment.

RESULTS

Year 1

Litter size averaged 1.23 and survival to weaning 89.6% for the 752 complete ewe/lamb records. Treatment had no effect on lamb birth weight, lamb survival at birth, to marking or to weaning. Survival rates to weaning were 0.92±0.01, 0.80±0.02 and 0.69±0.05 for single, twin and triplet born lambs respectively.

Treatment affected weaning weight ($P<0.001$) and growth rate to weaning ($P<0.001$) (Table 3). The growth rate of the litter increased by 1.5±0.4 g/day for each extra kg of ewe weight at joining ($P<0.01$), and varied by -14±4, 9±4 and 5±5 g/day from the mean for the 2, 3 and 5 year old ewes, which represented different sources as well as ages. Lamb weights at weaning or prior to slaughter for each sex varied significantly with treatment ($P<0.001$) with the highest weights from the intermediate feeding level (Table 3). The benefit of the 365 g/day of supplement could be attributed predominantly to 1 replication where lambs had a growth rate 15% better than the next best plot (550 g supplement /d).

Table 3. Mean ± SE growth rates (g/day), weaning weights (kg) and pre-slaughter weights (kg) of lambs fed supplement at 183,365 or 550 g/day (year 1)

	Supplement level (g/day) 183	365	550	Sig
Liveweights				
At birth Singles	5.4 ± 0.1	5.4 ± 0.1	5.3 ± 0.1	n.s.
Twins	4.3 ± 0.1	4.4 ± 0.2	4.3 ± 0.1	n.s.
At weaning [A]				
Ewes	28.7 ± 0.3	31.8 ± 0.4	30.4 ± 0.4	***
Cryptorchids	32.6 ± 0.4	35.4 ± 0.4	32.1 ± 0.4	***
Prior to slaughter [A]				
Ewes (6/1/92)	33.3 ± 0.4	35.5 ± 0.4	33.8 ± 0.4	***
Cryptorchids (13/2/92)	44.9 ± 0.6	47.9 ± 0.6	43.9 ± 0.9	***
Lamb growth to weaning				
Singles	271 ± 5	306 ± 6	280 ± 5	***
Twins	172 ± 6	211 ± 5	186 ± 5	***

[A] These values are for all surviving lambs and are least square means for single born lambs, at average birth day, average dam source group and average sire.

Year 2

Litter size averaged 1.77, there were 915 lambs at birth and at weaning there were 805 ewes with complete records. The highest birth weight was at 365 g/day of supplement and the lowest with no supplement ($P<0.05$, Table 4). Birth weight was also affected by litter size (singles 0.88t0.03 kg heavier than twins, $P<0.001$), lamb sex (rams 0.27±0.02 kg heavier than ewes, $P<0.001$), birth day (14±3 g heavier each day later; $P<0.001$), ewe origin (up to 0.25 kg difference, $P<0.001$), ewe liveweight at joining (24±4 g/ewe.kg, $P<0.001$) and replication i.e. paddock ($P<0.01$), but not sire of the lamb.

Table 4. Birth and weaning weights (kg), growth rates to marking and weaning (g/day) and survival (%) to marking and weaning in year 2

	Supplement level (g/day) Nil	183	365	550	Sig
Weight at birth	5.09 ± 0.05	5.17 ± 0.05	5.29 ± 0.05	5.26 ± 0.05	*
Weight at weaning	32.5 ± 0.3	32.9 ± 0.3	32.6 ± 0.3	33.4 ± 0.3	n.s.
Growth to marking	295 ± 7	298 ± 7	322 ± 3	317 ± 7	**
Growth to weaning	272 ± 3	275 ± 3	271 ± 3	279 ±3	n.s.
Survival to marking	88.4 ± 2.1	91.5 ± 1.8	91.7 ± 1.8	89.4 ± 2.0	n.s.
Survival to weaning	85.3 ± 2.4	88.9 ± 2.0	90.4 ± 2.0	87.7 ± 2.2	n.s.

The data are least square means after adjustment for birthday, ewe origin, sire group of lamb, litter size, lamb sex and ewe liveweight at day 100.

Growth rate to marking was highest with 365 and 550 g/day of supplement ($P<0.01$). Weaning weight was not significantly affected by treatment ($P = 0.07$), although ewes receiving 550 g/day tended to have the heaviest lambs (Table 4). Weaning weight was affected by litter size (singles 6.0±0.2 kg heavier than singles, $P<0.001$), lamb sex (cryptorchids 2.86±0.13 kg heavier than ewes, $P<0.001$), birth day (0.29±0.02 kg lighter each day later, $P<0.001$), ewe origin (1.4 kg difference in lamb weaning weight of progeny; $P<0.001$), ewe joining liveweight (0.22±0.02 kg heavier/kg extra ewe liveweight, $P<0.001$), sire of the lamb (1.2 kg differences at weaning in progeny of 5 sire types, $P<0.01$). There was no significant effect of replication i.e. paddock.

Treatment did not affect lamb survival. Lamb survival to marking and to weaning (Table 4) was affected by litter size ($P<0.01$ for both), birth day ($P<0.05$ at marking only), ewe origin ($P<0.05$ and $P<0.01$ respectively) and replication ie paddock ($P<0.001$ and $P<0.01$ respectively), but not sire of the lamb or ewe liveweight.

DISCUSSION

Lamb responses to ewe supplements plateaued at a level of 365 g/day despite differences between years in pasture availability. Responses were confined to early lamb growth in both years, to weaning weight in year 1 and to birth weight in year 2. Presumably the supplement provided more milk when the lamb is dependent on milk intake for growth (Robinson 1985). After this early period, pasture assumes more importance along with ewe body reserves and lamb genotype and the effects from supplementation during lambing are diminished. A related experiment (P. Holst, D. Hall and J. Nolan, unpublished data) found no effect of level of pregnant ewe supplement intake on milk production 4 weeks after lambing.

The response may have plateaued at 365 g/day because, above this level, substitution of grain for pasture may have occurred such that total energy intake may have not been increased significantly. In an experiment at Hamilton in Victoria (L. Cummins, pers. comm.) there was no effect on growth rates to weaning with 3500 kg pasture/ha and lupin grain at 200 g/day and then 400 g/day pre-lambing. Our 1:3 supplement of lupins and oats resulted in overall acceptable birth weights and pregnancy toxaemia was negligible on all treatments. However, the absence of a non-supplemented control group in year 1 may have masked a response to supplementation in that poor pasture year. In other experiments wheat has been a common supplement but Kenney and Roberts (1984) found oats and lupins were better supplements for ewes than wheat, and Hall *et al.* (1992) found lupins to be better than oats.

Method of supplementation may affect intake by individual ewes so that effective responses to supplementation may be achieved at moderate levels fed every second day. Daily feeding was not tested in this experiment. When ewes are supplemented in late pregnancy the responses in early lamb growth are greater the lower the pasture availability.

ACKNOWLEDGEMENTS

Financial assistance was provided by the Meat Research Corporation. Jodie Costello, Paul Reardon and Jayce Morgan are thanked for technical assistance.

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